IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:   10/567,499

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Applicant: Yue Ma, et al.

Group Art Unit: 2624

Examiner: Aaron W. Carter

Title: Automatic Image Cropping System and Method for Use with Portable Devices Equipped with Digital Cameras

Attorney Docket: 9432-000246/NPB

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION

I have reviewed the Examiner's office action and the cited Cheatle reference. For the reasons explained below, I conclude that the automated cropping system described in Cheatle is different, and does not produce the same "cropping" as our invention.

Our invention uses an entropy measure to automatically determine where to crop the image. Entropy measures the "business" of an image or region. Our specification gives a formal definition of entropy at paragraph [0020]. Our system uses the entropy measure as an indication of user "interest."

One advantage of our entropy measure is that it can be mathematically computed without a great deal of complex decision logic. Thus our entropy measure

works quite well for handheld devices that typically have minimal computational resources or memory.

The Cheatle reference describes a system that appears to use photographic compositional rules (such as the "rule of thirds") to determine where to automatically crop. Thus Cheatle uses a complex set of rules which the system must evaluate and, where conflicting results obtain, resolve any rule conflicts. In one embodiment the item of "interest" is tagged first so the algorithm can operate upon it.

In order to perform its rule-based analysis, Cheatle teaches that the image is first processed by: (1) optionally resampling to reduce number of pixels, (2) blurring the images and (3) merging regions of similar appearance. [see Cheatle paragraph 0049-0052. However, performing this preprocessing step on the image will change the entropy of the image. Blurring and merging will reduce the entropy of the affected region.

Thus Cheatle is clearly not designed to exploit the entropy as a measure of "interest" as we do in our invention.

To illustrate the difference between cropping based on compositional rules vs. entropy, I have attached two figures, Fig. A and Fig. B. Fig. A crops the raw image (on the left) into the composition (on the right) based on compositional rules. In the cropping in Fig. A, a balanced composition is constructed which avoids having any extraneous material in the edges of the composition and which capitalizes on the converging lines in the bus siding and windows.
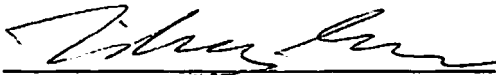
In Fig. B. an entropy-based cropping is illustrated. The region selected is the "busiest," i.e., high entropy region. The bus siding is relatively "flat" and has low entropy.

These are simply examples, intended to show the difference between compositional cropping and entropy-based cropping. Of course, different photographs would crop differently, depending on what is contained within the raw image.

Based on our analysis of the techniques taught in Cheatle, it is my opinion that one skilled in the art would recognize that Cheatle is not using an entropy measure to perform automatic cropping and that the entropy measure produces different results from the compositional-based approach of Cheatle.

Respectfully submitted.

Dated: 3/12/07   By: _____
                                       Jinhong Guo

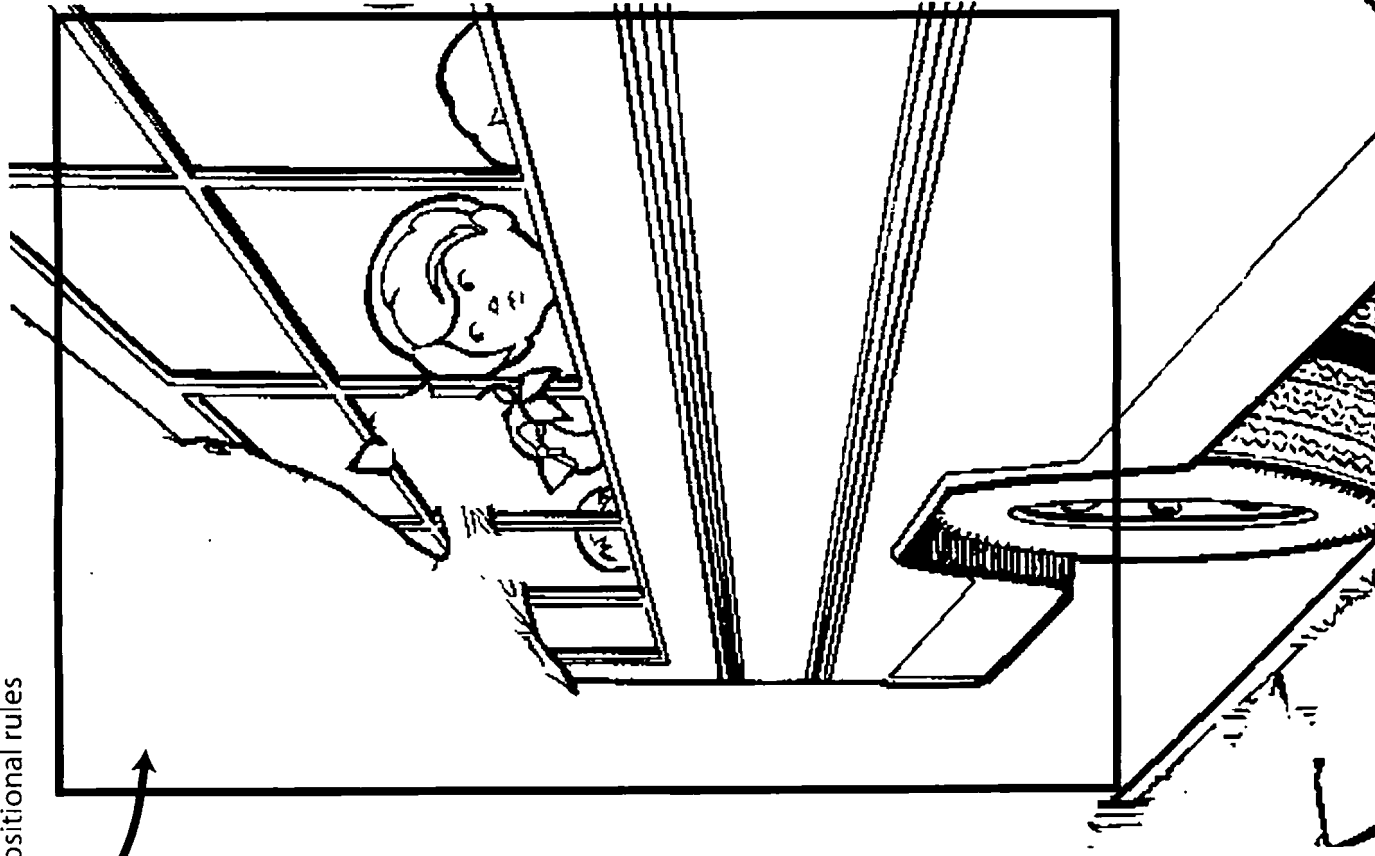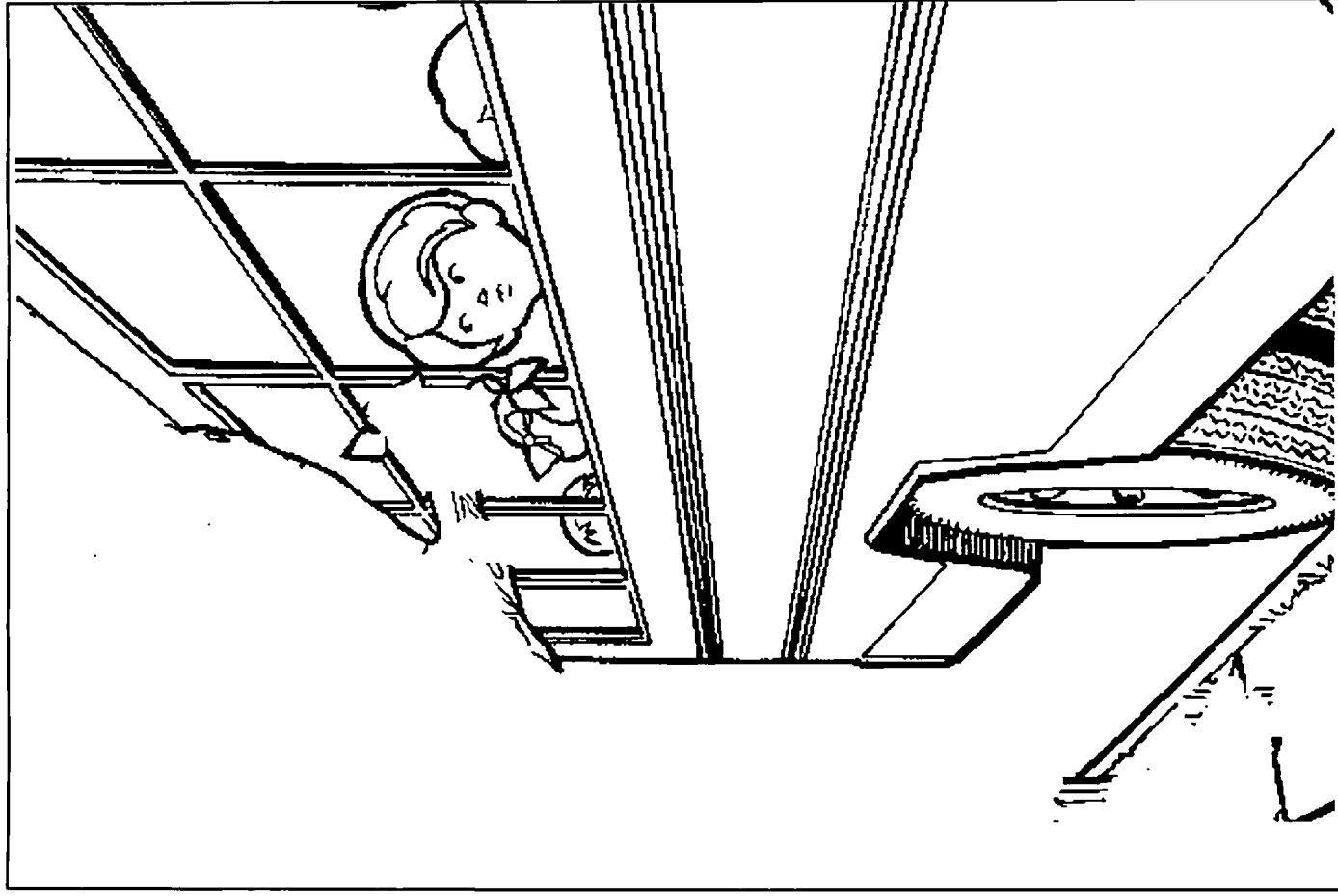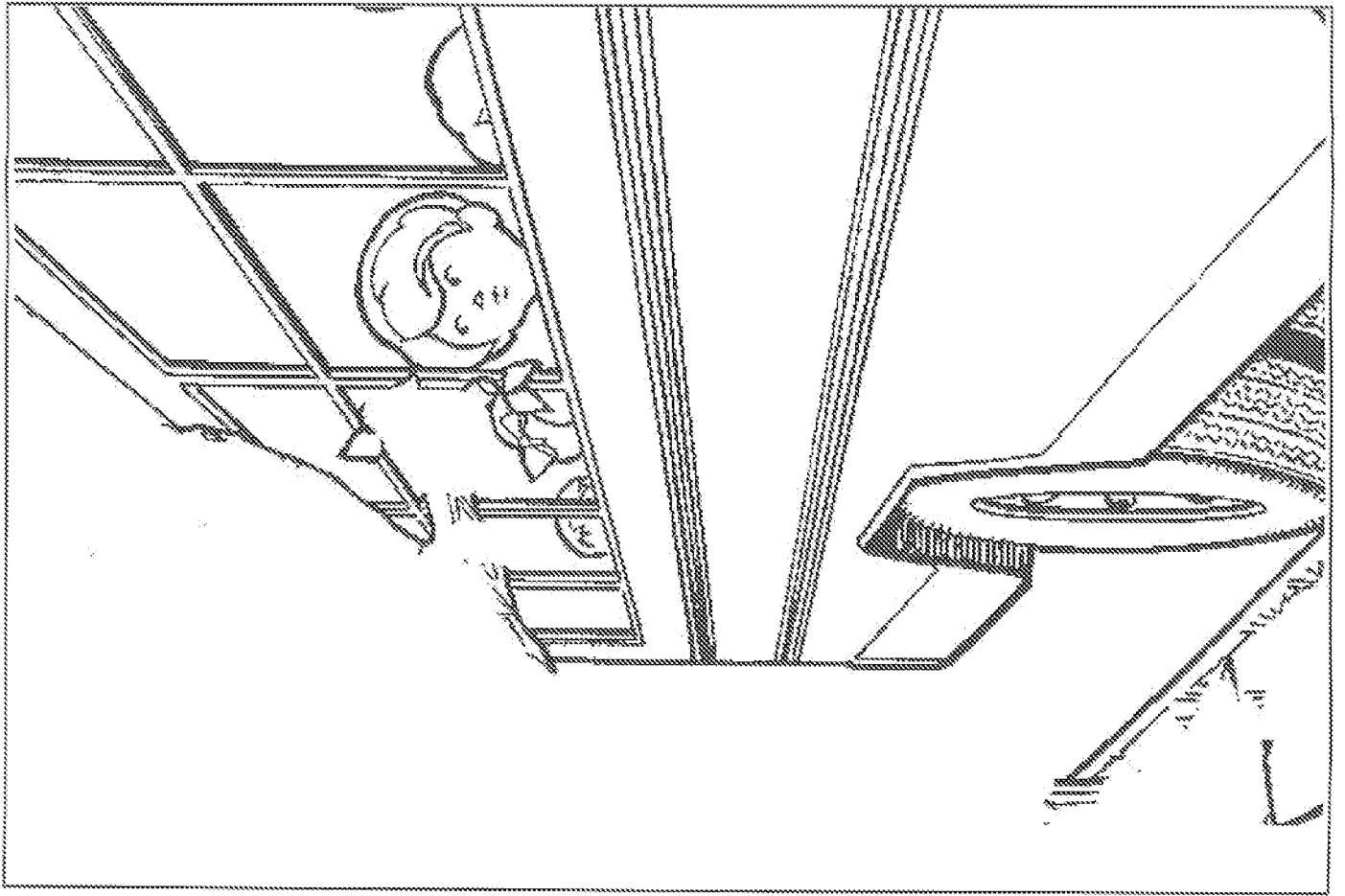Serial No. 10/567,499   Page 3

image.tif

Cropping based on
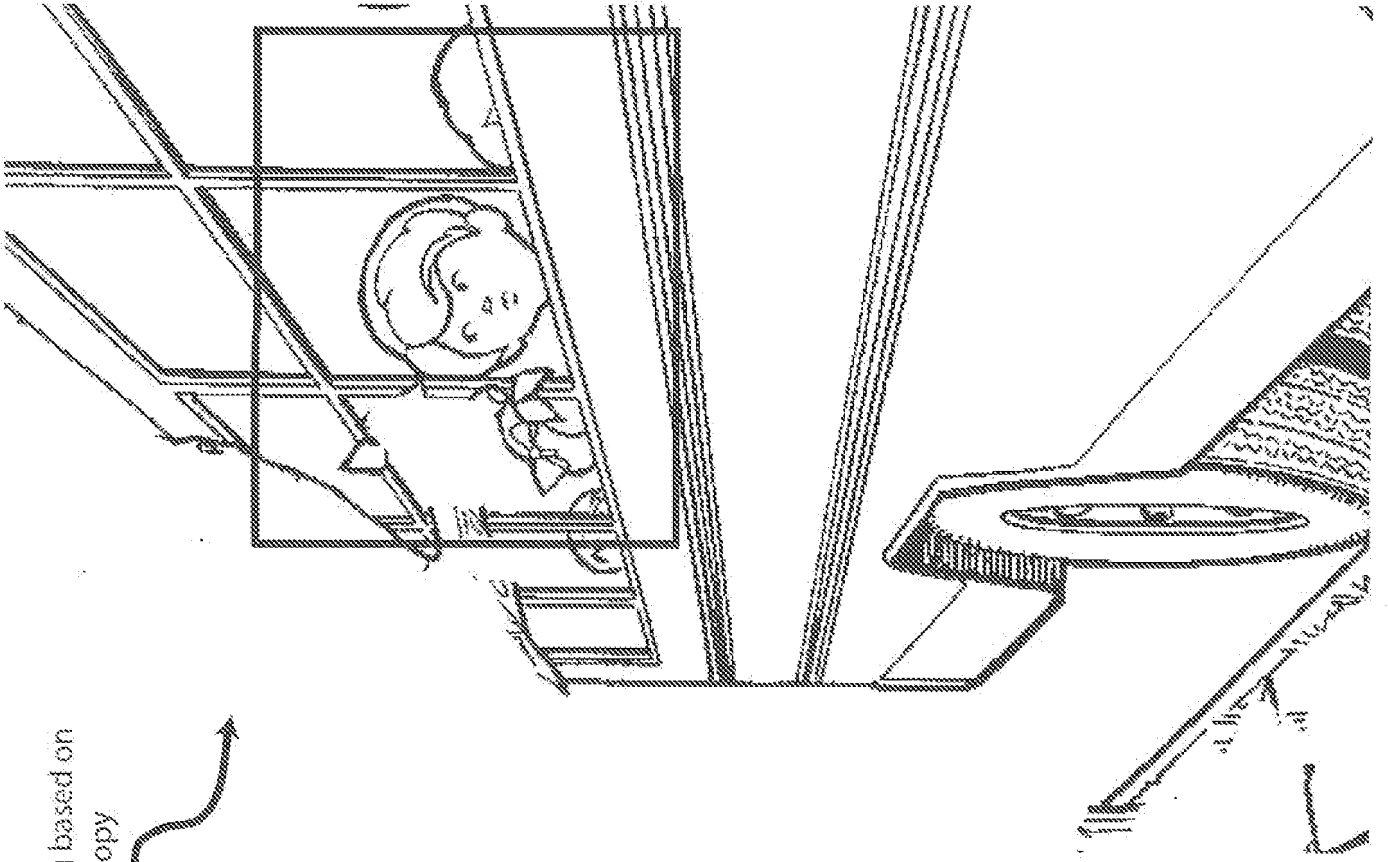compositional rules

Fig. A

Cropping based on high entropy

Fig. B